

What is claimed is:

1 1. Apparatus for generating video images on a
2 display device arranged in accordance with a digital video
3 standard comprising, in combination:

4 a) a processor for generating a plurality of
5 digital electrical signals in accordance with said
6 predetermined video standard, said plurality of digital
7 electrical signals including a first transmission protocol
8 signal;

9 b) a first connector, including a plurality of
10 pins, for receiving and directing each of said digital
11 electrical signals to a predetermined pin and for
12 receiving a second digital electrical transmission
13 protocol signal at a predetermined pin;

14 c) a second connector including a plurality of
15 pins arranged to receive each of said digital electrical
16 signals, direct each of said signals to a predetermined
17 portion of a port of said display device and to receive
18 said second digital electrical transmission protocol
19 signal from said port of said display device and direct
20 said transmission protocol signal to a predetermined pin
21 of said second connector;

22 d) an electrical-to-optical converter circuit
23 for receiving said digital electrical signals and
24 generating a plurality of digital optical signals in

25 response thereto and for receiving a digital optical
26 signal and generating said second digital electrical
27 transmission protocol signal in response thereto;

28 e) an optical-to-electrical converter circuit
29 for receiving a plurality of digital optical signals and
30 converting said signals to said plurality of digital
31 electrical signals and for converting said second digital
32 electrical transmission protocol signal to a digital
33 optical signal;

34 f) an optical cable in optical communication
35 with said electrical-to-optical converter and said
36 optical-to-electrical converter; and

37 g) said optical cable including a single optical
38 fiber for transmitting said optical signals between said
39 electrical-to-optical converter and said optical-to-
40 electrical converter.

1 2. Apparatus as defined in Claim 1 wherein said
2 electrical-to-optical converter circuit further includes:

3 a) a first branch for receiving a digital
4 optical signal and converting said signal to said second
5 digital electrical transmission protocol signal;

6 b) a second branch for receiving said first
7 digital electrical transmission protocol signal and an
8 electrical transmission protocol clock signal and for
9 converting said signals to a single digital optical
10 signal; and

11 c) a directional logic circuit in communication
12 with said first connector and with said first and second
13 branches for preventing retransmission of said second
14 digital electrical transmission protocol signal onto said
15 optical cable.

1 3. Apparatus as defined in Claim 2 wherein said
2 second branch of said electrical-to-optical circuit
3 further includes:

4 a) a light source; and

5 b) said light source being controlled by the
6 output of a logic gate; and

7 c) the inputs to said logic gate being said
8 first transmission protocol signal and the inverse of said
9 second transmission protocol signal.

1 4. Apparatus as defined in Claim 3 wherein said
2 logic gate comprises an EXCLUSIVE OR gate.

1 5. Apparatus as defined in Claim 2 wherein said
2 directional logic circuit includes:

3 a) a first node for receiving said second
4 transmission protocol signal;

5 b) a second node for receiving said first
6 transmission protocol signal and the inverse of said
7 second transmission protocol signal; and

8 c) a third node for receiving the inverse of
9 said second transmission protocol signal.

1 6. Apparatus as defined in Claim 5 wherein the
2 inputs to said EXCLUSIVE OR gate comprise the voltage
3 potentials at said second and third nodes.

1 7. Apparatus as defined in Claim 1 wherein said
2 plurality of electrical signals additionally comprise red,
3 blue and green information.

1 8. Apparatus as defined in Claim 1 wherein said
2 plurality of electrical signals additional comprises a
3 pixel clock.

1 9. Apparatus as defined in Claim 1 wherein said
2 optical-to-electrical converter circuit further includes:
3 a) a first branch for receiving a digital
4 optical signal and converting said signal to said first
5 digital electrical transmission protocol signal and to an
6 electrical transmission protocol clock;
7 b) a second branch for receiving said second
8 digital electrical transmission protocol signal and
9 converting said signal to a digital optical signal; and
10 c) a directional logic circuit in communication
11 with said second connector and with said first and second
12 branches for preventing retransmission of said first
13 digital electrical transmission protocol signal onto said
14 optical cable.

1 10. Apparatus as defined in Claim 9 wherein
2 said second branch of said electrical-to-optical circuit
3 further includes:

4 a) a light source; and

5 b) said light source being controlled by the
6 output of a logic gate; and

7 c) the inputs to said logic gate being said
8 second transmission protocol signal and the inverse of
9 said first digital electrical transmission protocol
10 signal.

1 11. Apparatus as defined in Claim 10 wherein
2 said logic gate comprises an EXCLUSIVE OR gate.

1 12. Apparatus as defined in Claim 9 wherein
2 said directional logic circuit includes:

3 a) a first node for receiving said first
4 transmission protocol signal;

5 b) a second node for receiving said second
6 digital electrical transmission protocol signal and the
7 inverse of said first digital electrical transmission
8 protocol signal; and

9 c) a third node for receiving the inverse of
10 said first digital electrical transmission protocol
11 signal.

12 13. Apparatus as defined in Claim 12 wherein
13 the inputs to said EXCLUSIVE OR gate comprise the voltage
14 potentials at said second and third nodes.

1 14. Apparatus as defined in Claim 1 further
2 characterized in that:

3 a) said plurality of digital electrical signals
4 generated by said processor includes an electrical
5 transmission protocol clock signal; and

6 b) said electrical-to-optical converter circuit
7 includes an electrical multiplexer for serially combining
8 said first electrical transmission protocol digital
9 electrical signal and said electrical transmission
10 protocol clock signal.

1 15. Apparatus as defined in Claim 14 further
2 including a light source, said light source being
3 responsive to said serially combined first electrical
4 transmission protocol signal and said electrical
5 transmission protocol clock signal to output a first
6 digital optical transmission protocol signal.

1 16. Apparatus as defined in Claim 2 wherein
2 said optical-to-electrical converter circuit further
3 includes:

4 a) a photodetector for converting said first
5 digital optical transmission protocol signal to a serial
6 combination of said first digital electrical transmission
7 protocol signal and said electrical transmission protocol
8 clock signal; and

9 b) an electrical demultiplexer for separating
10 said serial combination into said first digital
11 electrical transmission protocol signal and said
12 electrical transmission protocol clock signal.

1 17. Apparatus as defined in Claim 1 wherein
2 said electrical-to-optical converter circuit is further
3 characterized in that:
4 a) said plurality of digital electrical signals
5 includes a plurality of digital electrical video signals;
6 b) each of said digital electrical video signals
7 is arranged to modulate the output of one of a
8 corresponding plurality of light sources;
9 c) each of said corresponding plurality of light
10 sources is arranged to emit light of a different center
11 wavelength;
12 d) said center wavelengths of said corresponding
13 plurality of light sources defining a frequency band; and
14 e) the center frequency of said light source for
15 outputting said first transmission digital optical
16 transmission protocol signal is outside said frequency
17 band.

1 18. Apparatus as defined in Claim 1 wherein
2 said optical-to-electrical converter circuit further
3 includes:
4 a) a light source, said light source being
5 responsive to said second electrical transmission protocol
6 signal to output a second digital optical transmission
7 protocol signal; and
8 b) said light source is arranged to output light
9 of the same center frequency as said light for outputting
10 a first digital optical transmission protocol signal.

1 19. Apparatus as defined in Claim 18 wherein
2 said electrical-to-optical converter circuit further
3 includes:
4 a) an optical multiplexer;
5 b) said optical multiplexer being arranged to
6 receive said plurality of digital optical video signals
7 from said plurality of light sources of said frequency
8 band, said first digital optical transmission protocol
9 signal from said light source outside said frequency band
10 and said second digital optical transmission protocol
11 signal from said optical cable;
12 c) said optical multiplexer providing a single
13 optical signal onto said optical cable that comprises said
14 plurality of digital optical video signals and said first
15 digital optical transmission protocol signal; and
16 d) said optical multiplexer providing said
17 second digital optical transmission protocol signal to a
18 photodetector for generating said second digital
19 electrical transmission protocol signal.

1 20. Apparatus as defined in Claim 18 wherein
2 said optical-to-electrical converter circuit further
3 includes:
4 a) an optical demultiplexer;
5 b) said optical demultiplexer being arranged to
6 receive said second digital optical transmission protocol
7 signal and an optical signal that includes said plurality
8 of digital optical video signals and said first digital
9 optical transmission protocol signal from said optical
10 cable;
11 c) said optical demultiplexer providing said
12 second digital optical transmission protocol signal onto
13 said optical cable and said plurality of optical video
14 signals to a plurality of photodetectors for generating
15 said plurality of digital electrical video signals; and
16 d) said optical demultiplexer providing said
17 first digital optical transmission protocol signal to a
18 photodetector for generating said serially combined first
19 digital electrical transmission protocol signal and
20 electrical transmission protocol clock signal.

1 21. Apparatus for communication of a
2 bidirectional digital electrical signal, comprising
3 sequential forward and reverse transmissions, between a
4 bidirectional port of a first device and a bidirectional
5 port of a second device, and an associated electrical
6 clock signal between a clock port of said first device and
7 a clock port of said second device, said first and second
8 devices being remote from one another, said apparatus
9 comprising, in combination:

10 a) an electrical-to-optical converter circuit
11 for receiving a forward digital electrical signal and said
12 electrical clock signal and generating a forward digital
13 optical signal in response thereto and for receiving a
14 reverse digital optical signal and generating a reverse
15 digital electrical signal in response thereto;

16 b) an optical-to-electrical converter circuit
17 for receiving said forward digital optical signal and
18 converting said signal to said forward digital electrical
19 signal and said electrical clock signal and for converting
20 said reverse digital electrical signal to said reverse
21 digital optical signal;

22 c) an optical cable in optical communication
23 with said electrical-to-optical converter and said
24 optical-to-electrical converter; and

25 d) said optical cable comprising a single

26 optical fiber for transmitting said optical signals
27 between said electrical-to-optical converter and said
28 optical-to-electrical converter.

1 22. Apparatus as defined in Claim 21 wherein
2 said electrical-to-optical converter circuit further
3 includes:

4 a) a first branch for receiving said reverse
5 digital optical signal and converting said signal to said
6 reverse digital electrical signal;

7 b) a second branch for receiving said forward
8 digital electrical signal and said electrical clock signal
9 and converting said signals to said forward digital
10 optical signal; and

11 c) a directional logic circuit in communication
12 with said first connector and with said first and second
13 branches for preventing retransmission of said reverse
14 digital electrical transmission signal onto said optical
15 cable.

1 23. Apparatus as defined in Claim 22 wherein
2 said second branch of said electrical-to-optical circuit
3 further includes:
4 a) a light source; and
5 b) said light source being controlled by the
6 output of a logic gate; and
7 c) the inputs to said logic gate being said
8 forward digital electrical signal and the inverse of said
9 reverse digital electrical signal.

1 24. Apparatus as defined in Claim 23 wherein
2 said logic gate comprises an EXCLUSIVE OR gate.

1 25. Apparatus as defined in Claim 24 wherein
2 said directional logic circuit includes:
3 a) a first node for receiving said reverse
4 digital electrical signal;
5 b) a second node for receiving said forward
6 digital electrical signal and the inverse of said reverse
7 digital electrical signal; and
8 c) a third node for receiving the inverse of
9 said reverse digital electrical signal.

1 26. Apparatus as defined in Claim 25 wherein
2 the inputs to said EXCLUSIVE OR gate comprise the values
3 at said second and third nodes.

1 27. Apparatus as defined in Claim 21 wherein
2 said optical-to-electrical converter circuit further
3 includes:

4 a) a first branch for receiving said forward
5 digital optical signal and converting said signal to said
6 forward digital electrical signal and said electrical
7 clock signal;

8 b) a second branch for receiving said reverse
9 digital electrical signal and converting said signal to
10 said reverse digital optical signal; and

11 c) a directional logic circuit in communication
12 with said second connector and with said first and second
13 branches for preventing retransmission of said forward
14 digital electrical signal onto said optical cable.

1 28. Apparatus as defined in Claim 27 wherein
2 said second branch of said electrical-to-optical circuit
3 further includes:
4 a) a light source; and
5 b) said light source being controlled by the
6 output of a logic gate; and
7 c) the inputs to said logic gate being said
8 reverse digital electrical signal and the inverse of said
9 forward digital electrical signal.

1 29. Apparatus as defined in Claim 28 wherein
2 said logic gate comprises an EXCLUSIVE OR gate.

1 30. Apparatus as defined in Claim 29 wherein
2 said directional logic circuit includes:
3 a) a first node for receiving said forward
4 digital electrical signal;
5 b) a second node for receiving said reverse
6 digital electrical signal and the inverse of said forward
7 digital electrical signal; and
8 c) a third node for receiving the inverse of
9 said forward digital electrical signal.

1 31. Apparatus as defined in Claim 30 wherein
2 the inputs to said EXCLUSIVE OR gate comprise the voltage
3 potentials at said second and third nodes.

1 32. Apparatus as defined in Claim 21 wherein
2 said electrical-to-optical converter circuit further
3 includes an electrical multiplexer for serially combining
4 said forward digital electrical signal and said electrical
5 clock signal.

1 33. Apparatus as defined in Claim 32 further
2 including a light source, said light source being
3 responsive to said serially combined signal to output said
4 forward digital optical signal.

1 34. Apparatus as defined in Claim 21 wherein
2 said optical-to-electrical converter circuit further
3 includes:

4 a) a photodetector for converting said forward
5 digital optical signal to an electrical signal comprising
6 a serial combination of said forward digital electrical
7 signal and said electrical clock signal; and

8 b) an electrical demultiplexer for separating
9 said electrical signal comprising a serial combination of
10 said forward digital electrical signal and said electrical
11 clock signal into said forward digital electrical signal
12 and said electrical clock signal.